

Omni Newport News Hotel (Newport News, VA)

November 28-29, 2007

DAY 2: **10:25 – 11:30 am** **Summary discussion and policy issues—
facilitated panel discussion
(Moderator: James Sydnor, DEQ Air Division Director)**

David Foerter, Institute of Clean Air Companies
Gerald Keeler, University of Michigan
Jon Mueller, Chesapeake Bay Foundation
Michael Newman, Virginia Institute of Marine Sciences
Michael Rossler, Edison Electric Institute

Mr. Sydnor: (Asked each panelist to take a couple of minutes to comment on the Symposium, recapitulate the main points of their presentations, note issues not discussed in the Symposium, etc.)

Mr. Foerter noted a repeated trend in the history of air pollution controls of early concerns about the availability and technical maturity of control technologies leading later to widespread availability, improved performance, and reduced cost. The 1960s were marked by investment in electrostatic precipitators. SO₂ scrubbing (flue-gas desulfurization FGD) demand grew in the 1970s-80s and now achieves 98-99% removal efficiency at lower cost than previously available. In the 1990s NO_x controls, especially SCR (selective catalytic reduction) were considered by some to be “not available” despite use in Germany and Japan but are now at plants representing 100 GW out of 330 GW of U.S. generation. He feels that mercury control technologies, such as activated carbon injection (ACI)/powdered activated carbon (PAC), are available now and that mercury control technologies have progressed in technical and economic performance faster than the National Energy Technology Laboratory (NETL) had anticipated. Mr. Foerter discussed how vendor guarantees are based on vendor confidence in the technology. He also discussed how the air pollution control industry has installed more systems than expected despite EPA’s concern about skilled labor availability. He also mentioned raw materials demand and how vendors seek long term contracts. He reiterated that mercury control technology is available now.

Dr. Newman said that the Symposium had done a good job of covering mercury deposition and control but suggested that there was insufficient emphasis on receptors. While there was discussion of delivery of mercury to human populations, there should be greater emphasis on receptors as well as more discussion of “hot spots” and, indeed, what hot spots are. He said he was impressed and optimistic by the discussions. He also noted the need for more effective communication to limit human exposure to mercury from fishing; that consumption advisory signs are not so effective.

Mr. Mueller referred to Bill Becker’s presentation and discussion of the pending D.C. Circuit Court’s consideration of the Clean Air Mercury Rule (CAMR). He notes that the court will not hear arguments on the rule itself but on EPA’s authority under the Clean

Air Act. He also agrees with Mr. Becker that it would seem that industry would want regulatory certainty rather than uncertainty of legal challenges and a variety of different state approaches to mercury. Mr. Mueller also noted the case of a Canadian nuisance suit against a U.S. plant for air pollution as an example of uncertainty for industry from individual suits. He favors more uniform implementation of full air pollution controls, stating that all German electrical generating units (EGUs) were required to implement controls in 1985 and that Turkey requires such controls on electric utilities, in contrast to U.S. EGUs, many of which do not control all the major air pollutants. Also Mr. Mueller agreed that signage and web site advisories are inadequate for protecting against exposure to mercury from fish consumption.

Mr. Rossler reiterated industry's preference not to have to contend with numerous and varied individual state rules. He encouraged states to work with regulated companies to work out reasonable approaches and measures for control. He argued against "knee-jerk" approaches and suggested that some state[s] may adopt the highest levels of stringency for its own sake rather than on health and environmental bases. Consistent relatively uniform approaches can provide economies of scale to reduce the costs of control. Also Mr. Rossler noted that with electric utilities face numerous environmental requirements under different programs that a holistic approach toward environmental regulation of EGUs would be beneficial.

Dr. Keeler discussed the notion of hot spots, stating that there are really three types:

1. Biological—based on high levels of mercury in fish and wildlife,
2. EPA CAMR—a very particular definition that claims a hot spot as a body of water in which 50 or more percent of fish tissue mercury is attributable to EGUs, and
3. Atmospheric deposition.

He noted that the characteristics of receiving waters are very important. Two bodies of water may receive the same air deposited mercury loading but show different levels of contamination (methylmercury in fish tissue). Dr. Keeler asserted that much of the variability in mercury contamination can be from nearby emission sources. He also noted that there is much we do not know about paths of exposure. For instance, he referred to a study showing mercury in children who ate very little fish—where did the mercury come from? From fish meal fed to chickens? From other sources? Dr. Keeler criticized CAMR for its focus on inland fish to the detriment of considering marine fish mercury contamination. There remain many questions on sources of marine fish contamination, which could include coastal air deposition as well as possible natural sources (perhaps deep ocean vents). He also said it is important for modelers and others not to assume that elemental mercury emissions as inert--elemental mercury can change to reactive gaseous mercury and all mercury emissions are of concern.

Question/comment: There was a question on the cost of mercury controls per pound removal beyond the level that would be removed as a co-benefit of other air pollution controls.

Response: *Mr. Rossler* indicated that the \$2,000 to \$200,000 per pound removal cost that he cited in his presentation came from a 2007 NETL report (available from DOE/NETL online) on activated carbon injection (ACI) tests. Coal and power plant types and configurations greatly affect cost per pound removed.

Question/comment: One might expect that Virginia EGUs using bituminous coal may not need to use ACI because mercury objectives can be met as co-benefits of other pollution controls.

Response: *Mr. Rossler* noted that much depends on the particulars of regulations as well as the types and configurations of other controls. One can get a high level of control with flue-gas desulfurization (FGD).

Mr. Foerter said that employing SCR plus FGD is a “buy two, get one free” approach since the NO_x and SO₂ controls will deliver significant mercury control. It is possible use additives to enhance mercury removal by FGDs but the marginal costs may be quite high to, say, go from 86% mercury removal to 90+ percent removal.

Question/comment: Cost question is critical. For, say, a household is the cost of mercury control a latte per week or per month or more? Is this a \$50 million, \$500 million, or \$5 billion a year issue for Virginia? How should Virginia approach this? Utilities should not have to bear all the costs—North Carolina’s Clean Smokestack law allows utility cost recovery. The commenter also mention lead phase out from gasoline as an example successful regulation to rid us of a large source of toxic heavy metal emissions.

Response: *Mr. Mueller* noted that there is a tendency to overestimate costs of controls. There were predictions of very high SO₂ abatement costs but the reality was much lower cost (10% of some expected cost estimates). The sooner control equipment is installed the faster economies of scale are realized. He asserted that utilities have overstated costs, negative impacts, space constraints, and other factors for the SO₂ abatement program but when required were able to install FGD and keep plants operating. He feels this will be so for mercury control as well.

Mr. Rossler said that utilities want certainty because implementation takes times and requires careful planning. CAMR litigation has introduced uncertainty. Coordinating mercury controls with other environmental requirements (e.g., NO_x, SO₂, prospectively CO₂) is very complex. One way or another we all pay for these regulatory costs. Also, the negative perception of the coal fired utility industry is unhelpful. Utilities know there is a need to transition to future cleaner technologies but we still need to use coal.

Dr. Keeler said the commenter’s analogy to lead phase-out is a good one. We should get mercury out of fossil fuel and out of products. He also discussed interactions of mercury contamination with climate change. For instance, fluctuating water levels in lakes and reservoirs can be conducive to enhanced methylmercury formation by bacteria.

Question/comment: A commenter stated that, based on her experience on Virginia’s CAMR *ad hoc* work group, there is divisiveness between the utility industry and environmental organizations, with the utilities wanting to stick with the model EPA rule.

She viewed the call by some utilities to work together on the issue to be suspect. She also critiqued some of the cost discussion as not sufficiently addressing costs of exposure to human health.

Response: *Dr. Keeler* noted inadequate federal support for CAMR accountability (i.e., monitoring and assessment of CAMR's efficacy in reducing mercury deposition, concentrations in ecosystems and biota, and effects on humans). He stated that federal government is willing to spend about \$400,000 nationally for this when the amount should be that much per state.

Question/comment: There was a question regarding CAMR case before the D.C. Circuit Court.

Response: *Mr. Mueller* reiterated that the court is taking up the question of the development of the rule and EPA's authority rather than the rule itself. He feels that results of the Steubenville, OH mercury deposition study show EPA's approach to be faulty. Also he questions why EPA did not consider coastal marine fish in developing the rule. The court is questioning EPA's approach to de-listing mercury from applicability of the technology-based MACT (maximum achievable control technology) standards that typically applies to hazardous air pollutants.

Question/comment: There was a comment on externality costs and cost-benefit analysis, noting high per-pound mercury removal costs but asking what the costs of mercury impacts are.

Response: *Mr. Mueller* noted that the MACT standard for hazardous air pollutants is based on available technology rather than deriving from a cost-benefit analysis. He was concerned about monetizing health impacts for cost-benefit analyses. He also asserted that business and economic considerations regarding mercury can be manifested in other ways, asserting, for instance, that some states have underemphasized fish consumption advisories out of concern for negative impacts on the recreational fishing industry.

Question/comment: It was reiterated that SCR plus FGD are an effective combination for mercury removal and is beneficial to society; that, as Mr. Foerter had said it is a "buy two (NO_x and SO₂), get one (mercury) free" approach.

Response: *Mr. Mueller* acknowledges that it takes time to implement pollution control and that no one expects all utilities to immediately install SCR and FGDs. But he argued that it is better to act sooner than later. He cited Leonard Levin's presentation, which noted that it takes time for mercury to be cleared out after emission.

Mr. Foerter said that is adequate time to implement pollution controls and that the air pollution control industry and utilities need to work together. Earlier decisions on pollution control approaches will give both the utility and air pollution control industries certainty and time for planning and efficient implementation of controls.

Question/comment: Dr. Keeler was asked if Michigan's mercury rule is sufficient.

Response: *Dr. Keeler* noted that he is the only academic on the Michigan DEQ mercury rule workgroup. He had argued against mercury emission trading and often was the only one to raise certain issues. An electric utility and others had asserted that they could not meet mercury reductions of 90 percent or greater so the state allows averaging of emissions. Dr. Keeler said that he was able to persuade the group to include language that constrains averaging by not allowing averaging to create hotspots. He noted that his laboratory has been running mercury monitoring stations across Michigan for 15 years though there are no Mercury Deposition Network sites in the state.

Question/comment: Discussions and studies of externalities tend to focus on human health impacts. Is there quantification of ecosystem damage from mercury?

Response: *Dr. Newman* said that evaluating ecosystem damage is in its early stage but that human health impacts has dominated while ecology is deemed a lower priority for funding. He cited the work of David Evers (BioDiversity Research Institute, Gorham, ME) and his colleagues on mercury impacts on biota and ecosystems. He also noted some Virginia work on the Holston and South Rivers, which are contaminated from past land-based industrial mercury contamination.